X-ray mask support and process for preparation thereof.

an X-ray mask support comprises a support frame and a support film, wherein both of the support frame and the support film have a thermal expansion coefficient of not more than $1 \times 10^{-5} K^{-1}$ or wherein the thermal expansion coefficient of the support film does not exceed that of the support frame or wherein both the support frame and the support film have a thermal expansion coefficient of not more than $1 \times 10^{-5} K^{-1}$ and the support film has a surface roughness at least on the mask surface, of not more than 10 nm r.m.s. Basically a process for preparing the X-ray support film comprises the steps of forming a film on a substrate and sintering the film.

FIG. 1

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**DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<tr>
<th>Category</th>
<th>Citation of document with indication, where appropriate, of relevant passages</th>
<th>Relevant to claim</th>
<th>CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)</th>
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<tr>
<td>X</td>
<td>US-A-4 604 292 (R.D. EVANS et al.)&lt;br&gt;* Column 1, lines 35-40; column 2, lines 37-41; column 3, line 58 - column 4, line 10 *&lt;br&gt;---</td>
<td>1-33</td>
<td>G 03 F 1/00</td>
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<td>A</td>
<td>MICROELECTRONIC ENGINEERING, vol. 6, nos. 1-4, December 1987, pages 241-245, Amsterdam, NL; A. MADOURI et al.: &quot;Non hydrogenated materials for X-ray masks (Si3N4 and SiC)&quot;---</td>
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<td>A</td>
<td>US-A-3 873 824 (TEXAS INSTRUMENTS)---</td>
<td>34-47</td>
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</tbody>
</table>

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The present search report has been drawn up for all claims

Place of search: THE HAGUE 18-10-1990
Examiner: HAENISCH U.P.

**CATEGORY OF CITED DOCUMENTS**

- **X**: particularly relevant if taken alone
- **Y**: particularly relevant if combined with another document of the same category
- **A**: technological background
- **O**: non-written disclosure
- **P**: intermediate document
- **T**: theory or principle underlying the invention
- **E**: earlier patent document, but published on, or after the filing date
- **D**: document cited in the application
- **L**: document cited for other reasons
- **M**: member of the same patent family, corresponding document
**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

See sheet -B-

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

see annex -B-

The present partial European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.

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<td>The Hague</td>
<td>23-07-1990</td>
<td>HAENISCH</td>
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PLACE HOLDERS

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D: document cited in the application
L: document cited for other reasons
&: member of the same patent family, corresponding document
**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-8, 12-20, 24-30: X-ray mask with specific physical properties
   - Claims 9-11, 21-23, 31-33: Mask made of inorganic frame & film, e.g. silicon carbide, silicon nitride, sialon, carbon
2. Claims 34-47: Process for making a mask by sintering, e.g. organosilicon or pitch
3. Claims 48-58: Process for making mask using inorganic fibres or particles
4. Claims 59-71: Process for making mask including adhering film to frame and sintering before and/or after
5. Claims 72-74: Moulding process for making X-ray mask